REMARKS

I. Status of the Claims

Claims 1-24 are pending.

II. Supplemental Information Disclosure Statement

Applicants wish to bring to the Examiner's attention WO 03/014014 (Paparrato et al.), which was cited in the search report for the corresponding PCT international application. Because the search report was mailed to Applicants more than three months ago, the statement is filed under 37 C.F.R. § 1.197(c)(2) and is accompanied by the fee set forth in § 1.17(p).

Paparatto teaches polymer-encapsulated palladium catalysts and their use for making hydrogen peroxide. Paparatto teaches that the hydrogen peroxide generated can be used in oxidations catalyzed by titanium silicalite (such as the oxidation of propylene to propylene oxide using H_2O_2). However, Paparatto does not teach to use polymer-encapsulated palladium catalysts in admixture with a titanium silicalite in a process for generating the hydrogen peroxide in-situ in the presence of propylene to make propylene oxide.

III. Amendment to the Specification

The specification is amended to restore a line that was inadvertantly omitted from the text filed in the USPTO. The added text is adequately supported by the original disclosure, particularly the rest of the same paragraph. Applicants respectfully ask the Examiner to enter the amendment.

IV. Response to the Rejection under Section 102(b)

Applicants traverse the rejection of claims 1-6, 8-9, 11-16, and 18 under 35 U.S.C. § 102(b) as anticipated by Grey (U.S. Pat. No. 6,403,815), and they respectfully ask the Examiner to reconsider and withdraw the rejection in view of the following remarks.

Grey teaches liquid-phase olefin epoxidation with hydrogen and oxygen in the presence of a catalyst mixture comprising a titanium zeolite and a supported palladium catalyst (Abstract). Suitable supports for the palladium include "inorganic oxides, inorganic chlorides, carbon, and organic polymer resins" (col. 3, ll. 6-8). Preferred organic polymer resins include "polystyrene, styrene-divinylbenzene copolymers, crosslinked polyethyeleneimines, and polybenzimidazole" (col. 3, ll. 14-17). The palladium may be "supported on the support by impregnation, adsorption, ion-exchange, precipitation, or the like" (col. 3, ll. 43-44). As the Examiner indicated, the supported palladium catalyst can be combined with the titanium zeolite and be "pelletized or extruded together prior to use in epoxidation" (col. 3, ll. 65-66). In the examples, Grey supports the palladium on niobia (Ex. 2), carbon (Ex. 3), sulfonated carbon (Ex. 4), sodium aluminosilicate (Ex. 5), and silica (Ex. 6).

The Examiner says that Grey anticipates Applicants' claims because "the impregnated palladium material would be encapsulated by the polymer support." Applicants respecfully disagree.

A skilled person would understand from looking at the complete disclosure of Grey, including all of the examples, that palladium is meant to be deposited on the surface of the support. This is true whether the support is an inorganic oxide or carbon as in all of the examples, or an organic polymer resin as taught generally by Grey in column 3, because Grey teaches these as equivalents. In all of the working examples, the palladium must be on the surface of the support; there is no alternative. Clearly, Grey intended the other kinds of supports, including organic polymers, to be used the same way. Nothing in Grey teaches a skilled person to make a catalyst in which the palladium is encapsulated within a polymer coating because, as a skilled person recognizes, a polymer-encapsulated palladium is not the equivalent of palladium supported on the surface of a polymer support.

In Applicants' claimed catalysts, the titanium zeolite, the transition metal, or both, are "contained within and are surrounded by a thin layer of polymer." As Applicants explained (paragraph bridging pages 4 and 5), "To interact with the

polymer-encapsulated catalyst species, reactants must penetrate the polymer coating." Applicants taught many suitable ways to encapsulate transition metals and/or titanium zeolites within a polymer, none of which are contemplated by Grey. See, especially, the application at p. 5, l. 17 to p. 7, l. 14.

Encapsulation of the transition metal within a layer of polymer distinguishes these catalysts from the surface-supported catalysts taught by Grey. The reference does not contemplate palladium catalysts in which the reactants must penetrate a polymer coating to interact with the metal; in contrast, Applicants' claims require polymer encapsulation of at least the transition metal, the titanium zeolite, or both. Because Grey does not disclose the claimed polymer-encapsulated catalysts, the Examiner should withdraw the Section 102 rejection.

V. Response to the Rejection under Section 102(e)

Applicants also traverse the rejection of claims 1-5, 8-9, 11-16, and 18 under 35 U.S.C. § 102(e) as anticipated by Zhou et al. (U.S. Pat. No. 6,534,661), and they respectfully ask the Examiner to reconsider and withdraw the rejection in view of the following remarks.

Zhou teaches a dual-functional catalyst useful for making (1) hydrogen peroxide from hydrogen and oxygen, and (2) propylene oxide from propylene and hydrogen peroxide. The catalyst comprises "noble metal crystallites with dimensions on the nanometer scale . . . specially dispersed on titanium silicalite substrate particles" (see Abstract). Zhou uses a water-soluble ionic polymer such as sodium polyacrylate to help deposit active metal nanoparticles onto the titanium zeolite substrate. "The function of the ionic polymer is to act as a dispersing and control agent to disperse the metal particles on the surface and control their face exposition" (see col. 3, l. 66 to col. 4, l. 1).

The Examiner says that Zhou's method would "result in a polymer encapsulated transition metal." Applicants respectfully disagree.

Zhou's paragraph bridging columns 5 and 6, when read with Example 1 ("Preparation of the Dual-functional Catalyst"), is helpful for understanding the reference teachings. Zhou begins with an acidic, aqueous solution containing noble metal ions (e.g., Pd^{2+}), then adds another metal salt (e.g., $PtCl_2$). A "water-soluble catalyst impregnation control ionic polymer" (e.g., sodium polyacrylate) is then added. This gives a "mixed solution" that is then reduced (e.g., with hydrogen gas, as in Example 1). Reducing the solution with hydrogen is important because doing so precipitates nanosized Pd^0 and Pt^0 particles from the solution, thereby allowing them to be deposited on the substrate (titanium zeolite) in the next step. After reduction of the mixed solution with hydrogen, Zhou teaches "adding the particulate catalytic substrate [i.e., titanium zeolite] to the reduced mixed solution and impregnating the substrate *with the noble metal portion* of the reduced mixed solution" (see col. 5, line 66 to col. 6, line 2; emphasis added). A skilled person understands from this text that only "the noble metal portion" of the reduced solution is deposited on the titanium zeolite. The water-soluble acrylate polymer stays, of course, in the water phase. Thus, the polymer is removed along with the rest of the water phase when the aqueous mixture is filtered. The resulting "dual functional" catalyst is a titanium zeolite that is "impregnated" with nanoparticles of Pt and Pd that have a very particular "exposition" of crystal faces.

In contrast, consider Applicants' Example A. Palladium on TS-1 (0.15 wt.% Pd) is combined with a solution of polystyrene in cyclohexane. The mixture is cooled and hexanes are added to force polymer out of solution and around the Pd/TS-1 particles. Filtration and washing does not remove the polymer. This is evident because the product contains 80 wt.% TS-1, and thus almost 20 wt.% polystyrene as an encapsulant.

In sum, the Zhou process does not provide a "polymer-encapsulated" transition metal as contemplated by Applicants because the polymer, which must be water-soluble, stays in the water phase and is separated from the noble metal-impregnated zeolite during its preparation. In view of the above remarks,

Applicants respectfully ask the Examiner to reconsider and withdraw the Section 102(e) rejection.

VI. Response to the Obviousness-Type Double Patenting Rejection

Applicants do not concede that the claimed invention would have been obvious from copending Appl. Ser. No. 10/796,842 in view of U.S. Pat. No. 5,849,265 (Muller). To expedite prosecution, however, they offer the attached Terminal Disclaimer under 37 C.F.R. 1.321(c), which meets the statutory requirements. In view of the disclaimer, the Examiner should reconsider and withdraw the rejection for obviousness-type double patenting.

VII. Conclusion

In view of the above remarks, Applicants respectfully ask the Examiner to reconsider and withdraw the rejections and pass the case to issue. Applicants invite the Examiner to telephone their attorney at (610) 359-2276 if she believes that a discussion of the application might be helpful.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, P.O. Box. 1450, Alexandria, VA 22313-1450 on October 11, 2005.

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